



An Empirical Assessment of Competition in Jamaica's Commercial Banking Sector (2000–2024): A Dual Analysis Using the Herfindahl-Hirschman Index (HHI) and Panzar-Rosse Model

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Abstract

This study assesses the competitive dynamics of Jamaica's banking sector from 2000 to 2024 by integrating structural and non-structural analytical frameworks. The structural assessment utilizes the Herfindahl Hirschman Index (HHI) to measure market concentration, while the non-structural approach applies the Panzar–Rosse (P-R) model to estimate competitive behavior through the H-statistic, derived from the elasticity of revenues with respect to input prices using panel data. The first reduced-form P-R equation is used to evaluate the degree of competition, and the second equation tests for long-run equilibrium in the banking sector. The HHI reveals a persistently concentrated market led by two institutions, namely National Commercial Bank (NCB) and Scotia Bank Jamaica, with index values consistently exceeding the 1,800 points threshold. In contrast, the non-structural P-R model produces an H-statistic of 0.946, typically indicative of a monopolistic competition market. This apparent contradiction is resolved by the P-R model's rejection of the long-run equilibrium hypothesis, which confirms the presence of sustained profitability inconsistent with perfect competition. Consequently, Jamaica's commercial banking sector defies simple classification. It is neither an uncompetitive oligopoly nor a perfectly competitive market. Rather, it is a concentrated industry in motion. That is, competitive in conduct, yet constrained from reaching long-run equilibrium by structural frictions, barriers to entry, and enduring incumbent market power.

Keywords: Banking Competition, Herfindahl-Hirschman Index, Panzar-Rosse Model, Market Concentration

JEL Classification Code: C33, G21, L11, N26

1. Introduction

Jamaica underwent several transformative developments since the early 2000s including the modernization of the Bank of Jamaica's monetary policy framework¹, the adoption of Basel regulatory standards² and the rise of digital banking platforms. Mergers and acquisitions have also reshaped the market structure, potentially influencing competitive dynamics. The roster of banks in 2000 included institutions such as Scotia Bank Jamaica, Citibank, and National Commercial Bank Jamaica Limited. The early 2000s were marked by a series of consolidations and strategic repositioning, leading to notable name changes: Trafalgar Commercial Bank became First Global Bank Limited in 2001, Union Bank of Jamaica was acquired and renamed RBTT Jamaica Limited that same year, and CIBC Jamaica Limited was renamed First Caribbean International Bank (Jamaica) in 2002 following a joint venture.

Additional transformations included the licensing of PanCaribbean Bank Limited as a commercial bank in 2008, which later became Sagicor Bank Jamaica in 2012. A major consolidation occurred in 2014 when Sagicor Group acquired RBC Royal Bank (Jamaica), merging it with Sagicor Bank to operate as Sagicor Bank Jamaica Limited. The sector also saw building societies transition to commercial banks, with Jamaica National Building Society becoming JN Bank Limited in 2017 and JMMB Merchant Bank becoming JMMB Bank (Jamaica) Limited in that same year, increasing the number of commercial banks. In September 2024, First Caribbean International Bank adopted the name CIBC Caribbean Bank (Jamaica) Limited, fully aligning with its majority owner.

Further to these developments, the evolution of the financial system since the early 2000s has been marked by significant policy reforms, changes in regulatory oversight, and the rapid adoption of new technologies. These developments have unfolded against the backdrop of broader global trends, including financial liberalization, globalization and institutional consolidation. Consequently, there is a heightened need to assess the degree of competition in Jamaica's commercial banking sector, which is an indicator closely linked to the efficiency, stability and inclusiveness of financial services. Moreover, the country's exposure to external shocks such as the 2008 global financial crisis and the economic fallout from the COVID-19 pandemic emphasizes the importance of empirically examining how such events may have affected banking conduct and market power.

The relationship between bank competition and financial stability remains contested in the literature. The traditional "competition fragility" view asserts that intense competition erodes market power, compresses profit margins, and reduces banks' franchise value, ultimately increasing their risk-taking behavior. In contrast, the modern "competition stability" perspective argues that low competition can heighten default risk, as less competitive markets often lead to higher lending rates that make repayment more difficult. This environment can intensify moral hazard on the part of borrowers and adverse selection on the part of lenders (Berger, 2017).

¹ The Bank of Jamaica (Amendment) Act, 2020 was approved by both Houses of Parliament in December 2020 and took effect on April 16, 2021. Under this amended legislation, the Bank's primary mandate is to ensure price stability. The revised law formally adopts inflation targeting as the monetary policy framework to achieve this goal.

² Basel III is a set of international banking regulations developed by the Basel Committee on Banking Supervision (BCBS) to strengthen the global financial system in response to the weaknesses exposed by the 2008 financial crisis.

Similar debate is ongoing regarding the impact of bank competition on economic growth. One school of thought suggests that lower competition supports growth and enhances stability (Ijaz, 2020), while another contends that both competition and stability are significant long-term determinants of economic growth (Rakshit, 2019). From a user of banking products perspective, greater competition can lower borrowing costs and expand access to financial products. For policymakers, greater competition can enhance efficiency, reduce lending rates and improve the overall performance of the economy.

This study examines the evolution of competition in the Jamaican commercial banking sector over a 25-year period using two complementary indicators: the Herfindahl Hirschman Index (HHI), which provides a structural measure of market concentration and the PR model, which offers a behavioral measure of competition. By integrating these methodologies, the research captures both structural and strategic dimensions of competition, thereby filling a gap in the existing literature. The findings are intended to inform policy debates on regulatory effectiveness, market efficiency and inclusive financial access.

The remainder of this paper is organized as follows: Section 2 reviews the theoretical, conceptual and empirical literature; Section 3 outlines the data and empirical models; Section 4 presents the results, Section 5 discusses the results and Section 6 concludes.

2. Literature Review

Competition has been a central concern in financial economics, particularly in contexts where market power undermines, financial inclusion and or economic resilience. The empirical assessment of competition has historically been divided into two broad methodological traditions: structural based and conduct-based approaches.

Structural Approaches: HHI and Concentration Ratios

Structural models are grounded in the Structure Conduct Performance (SCP) paradigm, which asserts that market structure influences firm behavior and performance (Bain, 1951). The HHI is one of the most widely employed concentration measures in this tradition. Defined as the sum of the squared market shares of all firms in an industry, the HHI captures the relative size and distribution of firms and serves as a proxy for market power. Markets with HHI values below 1,000 points is often characterized as competitive markets, those with HHI values between 1,000 and 1,800 points are characterized as moderately concentrated market and markets with HHI above 1,800 points are characterized as a highly concentrated market (Bikker J. A., 2002).

Empirical studies applying the HHI across various jurisdictions have shown different results of market concentration. (Repková, 2012) found moderate concentration in the Czech Republic between 2000 and 2010, attributing variations in competition to shifts in the cost of capital and banking mergers. (Memić, 2015) applied HHI and concentration ratios in Bosnia and Herzegovina, concluding that the market had a declining concentration trend over 2008–2012, though competition remained limited.

In Latin America, studies such as (Camino-Mogro, 2018) demonstrate that Ecuador's banking sector had transitioned from a highly concentrated post-crisis system to one operating under monopolistic competition, largely due to regulatory reforms and market liberalization. Their application of HHI revealed persistently high concentration levels among large banks, which held significant market shares in loans and deposits.

In the Caribbean context, there is a scarcity of recent empirical studies on HHI. However, anecdotal evidence suggests that the Jamaican banking system remains oligopolistic, characterized by two large institutions, National Commercial Bank and Scotia Bank. The Central Bank's reports occasionally note the size of top-tier banks, yet a comprehensive time-series assessment of market structure has not been reported.

As a tool for assessing market power, the HHI has major limitations. Its most significant flaw is it assumes that the relevant market has been properly defined. As (Werden, 1992) notes, market definition is a complex legal and economic process, not an exact science. If the market is incorrectly defined, the HHI becomes a flawed tool for assessing market power. For example, a merger may seem benign in a broad market ("beverages") but harmful in a narrower one ("soft drinks"), showing that the HHI merely calculates concentration within contested boundaries.

Moreover, the HHI offers a static view of market structure, overlooking dynamic factors like market contestability. (Baumol, 1982) showed that even a single supplier market may price competitively if entry barriers are low. The HHI ignores this dynamic, potentially exaggerating competition concerns in markets that are contestable. It reflects current structure but fails to account for future competitive pressures that protect consumers.

Non-Structural Approaches: Panzar-Rosse Model

While structural measures provide insight into the market structure, they may not account for firms' strategic behavior. Non-structural approaches, derived from the New Empirical Industrial Organization (NEIO), address this limitation. Among these, the (Panzar J, 1987) model is widely used to estimate competitive conduct based on the responsiveness of bank revenues to input prices.

The Panzar-Rosse H-statistic is derived from a reduced-form revenue function in which revenues are regressed against factor input prices. The appeal of the P-R model lies in its relative simplicity and minimal data requirements compared to the more complex conjectural variations models (Shaffer, 1982). It also enables testing for long-run equilibrium by replacing revenue with return on assets (ROA) in the regression model. Equilibrium exists if the H-statistic equals zero.

Numerous studies have employed the P-R model globally. In Latin America, (Gelos, 2004) found monopolistic competition in Argentina, Brazil, Chile, and Mexico. (Claessens, 2004) applied the model across 50 countries and found a robust negative relationship between bank concentration and competition, challenging the SCP hypothesis. In European markets, (De Bandt, 2000) and (Bikker J. A., 2009) observed persistent monopolistic competition despite increasing consolidation.

In the Caribbean, direct applications of the P-R model remain scarce. However, (Memić, 2015) and (Camino-Mogro, 2018) offer useful methodological templates. In both studies, the H-statistic ranged between 0 and 1, indicating monopolistic competition. These results underscore the importance of market structure and regulatory evolution in shaping competitive outcomes.

An important caveat to the P-R model is the requirement of long-run equilibrium for valid interpretation. (Matthews, 2007) argue that this assumption may not hold in transition economies or post-crisis

settings, thus affecting the interpretation of H-values. For this reason, empirical applications increasingly include equilibrium tests using Returns on Asset (ROA) regressions.

Furthermore, the model is highly sensitive to the specification of the revenue equation and the definition of its variables, a fundamental critique, articulated by (Shaffer, 2004). When applied to banking, the use of total interest revenue or total revenue as the dependent variable is problematic because it conflates price and quantity effects. A rise in input costs may lead banks to raise output prices (reducing quantity demanded) or to seek riskier assets to maintain margins. This means the measured revenue response may reflect risk-taking or product differentiation rather than the competitive structure of the market, leading to misinterpretation.

Finally, the P-R model provides a measure of competitive conduct but fails to identify the structure behind it. A high H-statistic indicating competitive conduct could stem from a contestable market with low barriers to entry, even if only a few firms are present. Conversely, as (Claessens, 2004) note, the model cannot distinguish among different market structures that yield similar competitive outcomes. Moreover, it treats the entire market as a single entity, obscuring potential variations in competitive conditions across different product segments, bank sizes, or geographic regions within the same national market.

Integrative Use of HHI and Panzar-Rosse

Recent literature suggests that neither structural nor non-structural measures should be used in isolation. (Carbó, 2009) demonstrate that different measures of competition (Lerner index, HHI, P-R H-statistic) can yield divergent results within the same market. Thus, combining HHI with the P-R model offers a more nuanced understanding of both the structural and non-structural dimensions of competition.

Studies adopting this integrated approach include (Coccorese, 2013) in Italy, who found high concentration levels coexisting with monopolistic competition, and (Bikker J. A., 2008), who emphasized the need to control for macroeconomic variables and regulatory context in interpreting competition indicators. These findings reinforce the importance of considering both structural and behavioral dimensions in regulatory assessments.

Implications for Jamaica

For Jamaica, an integrated analysis using HHI and the P-R model could fill an important empirical gap. While anecdotal and descriptive evidence from the Bank of Jamaica and financial press indicate an oligopolistic structure led by a few institutions, the actual competitive conduct of these banks should be explored.

However, a key application of the P-R model in the Jamaica context is found in the work of (Daley, 2010). The study assessed the competitive conditions within the Jamaican banking market from 1998 to 2009, a period encompassing significant financial sector reforms and external economic shocks. The study concluded that the Jamaican banking sector operated under monopolistic competition over the entire period, a conclusion supported by an H-statistic between zero and one.

However, their analysis revealed a crucial nuance: the degree of competition was not static. They observed that the level of competition decreased in the latter half of the 2000s, a finding they attributed to a wave of consolidation within the sector. This increased market concentration, while not leading to a pure monopoly, reduced the competitive pressures that had been more prevalent earlier in the decade.

Nevertheless, given the increasing adoption of digital banking, expansion of credit unions and the entry of fintech players, the competitive dynamics may have shifted substantially, despite concentration remaining structurally high. Moreover, episodes such as the 2008 global financial crisis and COVID-19-induced liquidity measures may have altered pricing strategies and market discipline.

Therefore, this study aims to provide comprehensive, data-driven assessment of competition in the Jamaican commercial banking sector over the period 2000 to 2024, offering valuable insights for policymakers, regulators and scholars alike.

3. Methodology

This study employs a dual-method empirical strategy to assess the degree of competition in Jamaica's commercial banking sector between 2000 and 2024. This dual framework allows for a richer interpretation of competition by juxtaposing the structural features of the banking sector (as reflected in HHI) with actual firm behavior (as revealed by the Panzar-Rosse H-statistic). The data for all variables included in this study were collected from the Bank of Jamaica (BOJ), the country's central bank and primary source of monetary and financial statistics.

Herfindahl-Hirschman Index

The HHI is the most widely used measure of concentration in the theoretical literature and often serves as a benchmark for the evaluation of other concentration indices. The first merger guidelines to reference an HHI threshold were the U.S. Department of Justice merger guidelines issued in 1982. In this study, the HHI is calculated annually as the sum of square values of individual bank shares in the category observed (assets, loans, and deposits) and is calculated in the following way:

$$HHI = \sum_{i=1}^n s_i^2$$

Where:

- n – Number of Banks
- s – Market Share of Bank i

The HHI considers the relative size distribution of the firms in a market. It approaches 0 percentage points when a market is occupied by many firms of relatively equal size and reaches its maximum of 10,000 points when a market is supplied by a single firm. As mentioned in US Merger Guidelines³ (2023), HHI up to 1,000 points is described as an unconcentrated market, HHI between 1,000 and 1,800 points is

³ The Federal Trade Commission and Department of Justice introduced a major revision to the US merger guidelines in December 2023. This update marks a decisive shift toward a stricter antitrust enforcement policy, replacing the earlier guidelines established in 2010 and 2020.

described as a “moderately concentrated” market and above 1,800 points as “highly concentrated” markets. While they referred to an increase in HHI of 100 as a “significant increase” (see table 1). Increasing HHI is often interpreted as a decrease in competition and increase in the market power of leading firms. Similarly, a decreasing HHI is often interpreted as an increase in competition (Gajurel, 2012). In this study, three alternative measures of market share were used to calculate HHI namely: Total loans, Total Assets and Total Deposits.

Table 1. Interpreting the Herfindahl-Hirschman Index

HHI	Characteristic of Market Concentration
< 1,000	Unconcentrated Market
$1,000 \leq H \leq 1,800$	Moderately Concentrated Market
$H > 1,800$	Highly Concentrated Market

Panzar-Rosse Model (P-R Model)

The P-R model (Panzar J, 1987) also referred to as the H-statistic, measures the elasticity of firm revenues with respect to input prices, known as the H-statistic. A low H-statistic suggests firms possess market power, as they cannot pass cost increases to customers, whereas a high H-statistic is consistent with competitive conduct, where revenue moves closely with input costs. The H-statistic is the sum of the elasticities of the total revenue of the firms with respect to their factor prices. The intuition of the H-statistic is as follows. For a profit maximizing firm, marginal cost equals marginal revenue at the equilibrium. After input prices increase, marginal costs increase. According to the P-R model, the revenue and cost functions are as follows:

$$R_i = (y_i, n, Z_i) \quad (1)$$

$$C_i = (y_i, w_i, x_i) \quad (2)$$

Where R_i represents total revenue, C_i represents total cost, y_i represents output, n represents the number of banks, Z_i represents exogenous variables that affect revenue, w_i represents input prices and x_i represents exogenous variables that affect cost. In addition, if the market is in equilibrium, where Marginal Revenue (MR) is equal to Marginal Cost (MC), the zero-profit constraint should hold at market level:

$$R_i^*(y_i^*, n^*, Z_i) - C_i^*(y_i, w_i, x_i) = 0 \quad (3)$$

Variables marked with * represent equilibrium values. The market power is measured by the extent to which a change in factor input prices is reflected in the equilibrium revenues earned by bank i. The H statistic is derived as the sum of the elasticities of the reduced form revenues with respect to k factor prices. That is:

$$H = \sum_{k=1}^K \frac{\partial R_i^*}{\partial w_k} \frac{w_k}{R_i^*} \quad (4)$$

The reduced form equation to measure bank competition is:

$$\ln IIn_{it} = \varphi_0 + \varphi_1 \ln POD_{it} + \varphi_2 \ln POL_{it} + \varphi_3 \ln POC_{it} + \varphi_4 \ln LA_{it} + \varphi_5 \ln LC_{it} + \varphi_6 \ln CA_{it} + \varphi_7 DV_{it} + \mu_{it} \quad (5)$$

Where IIn designates for Interest Income of the banks, POD (Price of Deposits) is the ratio of interest expenses to total deposits; POL (Price of Labor) is the ratio staff expense to total assets; POC (Price of Capital) is the ratio of fixed asset expenses to total fixed assets. Control variables were involved in the model above which includes, LA (ratio of Loans to Assets measuring portfolio risk); LC (Loans to Capital, measuring credit risk); CA (ratio Capital to Assets, measuring funding risk) and DV which represents interaction terms to capture the effects of covid and the recession. As a result, the H statistic is given by:

$$H = \varphi_1 + \varphi_2 + \varphi_3 \quad (6)$$

To verify the condition of long-run equilibrium, the following regression is estimated:

$$\ln ROA_{it} = \varphi_0^* + \varphi_1^* \ln POD_{it} + \varphi_2^* \ln POL_{it} + \varphi_3^* \ln POC_{it} + \varphi_4^* \ln LA_{it} + \varphi_5^* \ln LC_{it} + \varphi_6^* \ln CA_{it} + \varphi_7^* DV_{it} + \mu_{it} \quad (7)$$

The above equilibrium regression model used the natural logarithm of return on assets (lnROA) as the regressand, and it is argued that the equilibrium condition E (or E-statistic) exists in the market when:

$$E = \varphi_1^* + \varphi_2^* + \varphi_3^* = 0 \quad (8)$$

While a value of E that is less than 0 reflects disequilibrium.

Table 2. Interpreting the Panzar-Rosse H-Statistic and Equilibrium Test

Parameter Region	Competitive Environment
$H \leq 0$	Monopoly
$0 < H < 1$	Monopolistic Competition
$H = 1$	Perfect Competition

Source: (Panzar J, 1987)

Table 3. Interpreting the Equilibrium Test

Parameter Region	Market Equilibrium Test
$E = 0$	Equilibrium
$E \neq 0$	Disequilibrium

Source: (Panzar J, 1987)

4. Results

Panzar-Rosse Model

The empirical assessment of competitive conduct in the Jamaican commercial banking sector was undertaken within the P-R framework, estimated using a balanced panel of banks. The dependent variable, $\ln IIn_{it}$, represents the natural logarithm of interest income, a revenue measure that captures banks' interest-earning activities. The primary regressors are the natural logarithms of the factor prices namely $\ln POC$ (price of capital), $\ln POD$ (price of deposits), and $\ln POL$ (price of labour) which proxy the marginal cost structure of banking operations. To account for structural breaks induced by exogenous macroeconomic shocks, interaction terms were incorporated to measure the differential impact of input prices during the COVID-19 pandemic (POC_{covid} , POD_{covid} , POL_{covid}) and the recession period (POC_{rec} , POD_{rec} , POL_{rec}).

The Wald test of the equilibrium condition ($\ln POC + \ln POD + \ln POL = 0$) strongly rejects the null hypothesis ($\chi^2 = 59.48$, $p = 0.0000$). This implies that the banking sector is not in long-run equilibrium. In other words, banks' revenues are still sensitive to changes in input prices, reflecting ongoing adjustments in market structure, entry/exit dynamics, or evolving cost conditions.

The estimation was performed via random effects (RE) panel regression. The appropriateness of the RE specification was formally evaluated using the Hausman specification test, which examines the orthogonality between the unobserved bank-specific effects and the explanatory variables. The test produced a χ^2 statistic of 5.352 with an associated p-value of 0.500, leading to the non-rejection of the null hypothesis that the RE estimator is both consistent and efficient. This outcome implies that unobserved heterogeneity across banks is not systematically correlated with the included regressors, thereby validating the use of RE over fixed effects. The adoption of RE not only preserves both within-bank and between-bank variation but also enhances estimation efficiency under the maintained exogeneity assumption. This is particularly advantageous in banking competition studies where institutional idiosyncrasies, such as differences in size, ownership, or business model, could bias pooled OLS estimates if not properly controlled.

For the full sample period, the factor price elasticities are 0.136 for capital, 0.339 for deposits, and 0.471 for labor. The corresponding H-statistic, calculated as the sum of these elasticities, is 0.946. In the PR taxonomy, an H-statistic strictly between zero and one is consistent with monopolistic competition, whereas values approaching one suggest behavior close to perfect competition. The magnitude of 0.946 thus signals that the sector operates in a monopolistic competitive environment. Economically, this implies that variations in input prices are almost fully transmitted to changes in interest income.

The inclusion of COVID-19 interaction terms uncovers statistically significant parameter shifts during the pandemic. The elasticity of revenue with respect to the price of capital declines by 0.350 ($p = 0.033$), while that for the price of deposits falls by 0.203 ($p = 0.013$), both indicating reduced pass-through from these cost components to bank revenues. In contrast, the labor price elasticity increases by 0.396 ($p = 0.015$), suggesting a heightened sensitivity of revenues to labor costs during this period. The adjusted H-statistic for the pandemic period is 0.789, marking a reduction in competitive intensity relative to the baseline. This attenuation is consistent with pandemic-induced frictions such as liquidity hoarding, risk repricing, and temporary shifts in cost structures that may have constrained banks' ability to fully adjust revenues to marginal cost changes.

By contrast, the interaction terms for the recession period are statistically insignificant across all three factor prices, indicating no meaningful departure from baseline elasticities. The adjusted H-statistic for the recession period is 0.958, essentially indistinguishable from the overall estimate. This suggests that recessionary conditions, unlike the pandemic shock, did not exert measurable influence on banks' competitive conduct. The stability of the H-statistic across this sub-period could reflect strong capital positions, supportive macroprudential policy, and the persistence of contestable market conditions that mitigated potential competitive distortions.

HHI

The HHI values for the Jamaican banking sector consistently exceed the 1,800 point threshold throughout the 25-year period, indicating a highly concentrated market structure led by the top three largest institutions, National Commercial Bank (2000 – 2024), Scotia Bank Jamaica (2000 – 2024) and RBC (2000 – 2012) / Sagicor Bank (2012 – 2016) / JN Bank (2017 – 2024). Collectively, for the 25 – year period (2000 – 2024) these banks account for approximately 70–90% of total banking assets, 68–92% of outstanding loans and 70–90% of customer deposits. This concentration profile reflects a market in

which competitive pressures may be subdued, with the leading firms holding substantial market power across three dimensions of competitive interaction (loans, assets and deposits).

The HHI for total assets started at 3,032 points in 2000 and gradually declined to 2,272 points by 2024, reflecting a slow but steady reduction in concentration. Despite this decline, the market remains far above the 1,800 points threshold, signaling limited competition. Based on loans, HHI was even higher, peaking at 3,953 points in 2000 before falling to 2,066 points in 2024, underscoring the prevalence of large banks in credit provision. Deposits, while still highly concentrated, indicated the middle ground between the three dimensions of competition with HHI values of 3,128 points in 2000 to 2,079 points in 2024, suggesting that depositors distribute their deposits more evenly across banks compared to loans or assets.

The entry of Sagicor in 2008 and JN Bank and JMMB in 2017 led to significant reductions in HHI across all metrics. For example, the assets based HHI dropped by 129 points after Sagicor's entry and another 647 points after JN Bank and JMMB entered. However, these changes were insufficient to disrupt the market share of incumbents. Sagicor's acquisition of RBC Royal Bank after 2013 caused a slight uptick in HHI, particularly for loans. This highlights the resilience of the oligopoly even with new entrants, the top three banks maintained an overwhelming their high market share.

An analysis of the HHI based on the alternative dimensions of competition results reveals notable differences in market concentration across key banking activities (see table 6 in appendix). Loans exhibit the highest concentration levels, with HHI values consistently surpassing those for assets or deposits. This pattern suggests that large banks dominate the lending market. In contrast, deposits display the lowest concentration, indicating relatively greater competition in attracting customer savings possibly driven by smaller banks offering higher interest rates or enhanced service quality to challenge incumbents. Asset concentration falls between these two extremes, reflecting the overall market power of the leading banks, which collectively control a disproportionality large share of the sector's financial resources.

Profitability

The profitability data reveals that the banking sector that has undergone notable shifts, particularly with the entry of JN and JMMB in 2017. Prior to their arrival, the market was concentrated with National Commercial Bank, and Scotia Bank Jamaica whose performances largely dictated industry trends. During the 2000 – 2016 period, industry profitability fluctuated between 0.13 and 0.33, with the top three banks often driving these movements. Scotia Bank Jamaica stood out as a high performer, especially in the early 2010s, while NCB provided steady returns. CIBC, however, experienced a prolonged period of negative profitability from 2010 to 2016, which weighed on the industry average. The pre-2017 landscape was characterized by clear market leadership, with limited competitive pressure from smaller players, allowing the major banks to maintain relatively stable profit margins.

The entry of JN and JMMB in 2017 introduced new dynamics into the market. Initially, both banks recorded modest but positive profitability, with JMMB performing notably stronger than JN. Their arrival coincided with a period of moderate industry profitability (0.18–0.23), suggesting they entered during a relatively stable phase. However, their impact on the overall profitability of the top three banks appears

limited in the short term. Scotia Bank Jamaica, NCB, and CIBC continued to exhibit trends consistent with their pre-2017 trajectories: Scotia Bank's profitability continued its gradual decline from earlier highs, NCB maintained its consistency, and CIBC sustained its post-2016 recovery. This indicates that the new entrants did not immediately disrupt the market share or profitability structures of the incumbent banks, possibly due to their smaller scale or targeted customer segments.

Over time, however, the presence of JN and JMMB may have contributed to increased competitive pressures, particularly in a lower-growth industry environment. From 2017 onward, industry profitability has generally trended lower, dipping to 0.07 in 2020 and remaining subdued at 0.11 in 2024. While this decline is also influenced by broader economic factors such as the COVID-19 pandemic the addition of two more players likely intensified competition for customers and margins. JMMB managed to sustain positive returns through 2024, though at a diminishing rate, while JN fell into negative profitability in 2023. This suggests that new entrants face significant challenges in achieving sustainable profitability, especially in a market where established banks like NCB and Scotia Bank Jamaica continue to command strong footholds.

When comparing the periods before and after 2017, the most striking difference is the compression of industry-wide profitability and the increased volatility among certain players. Before 2017, the top three banks collectively experienced wider profitability swings, with highs above 0.65 (Scotia Bank Jamaica in 2011) and lows below zero (CIBC). After 2017, profitability ranges have narrowed, with most banks clustering between 0 and 0.3. The newcomers have not challenged the top banks in scale, but their presence coincides with a phase of lower and more stable industry returns. This could reflect a more saturated market where new entrants absorb marginal demand, preventing incumbents from capturing disproportionate profit growth.

5. Discussion

The integrated application of the Panzar–Rosse model and the Herfindahl-Hirschman Index (HHI) offers complementary perspectives on the competitive dynamics of the Jamaican banking sector. The empirical findings present a compelling paradox: the Panzar-Rosse H-statistic suggests a market approximating perfect competition, while the HHI data depicts a concentrated oligopoly. Resolving this paradox requires a deep examination of the long-run equilibrium condition and the structural dynamics at play.

5.1 The Equilibrium Condition: A Theoretical Benchmark

To accurately interpret the Panzar-Rosse results, one must first understand the theoretical benchmark of a market in long-run equilibrium. In a perfectly competitive market operating in equilibrium, two conditions should hold simultaneously. First, the H-statistic should be equal to one ($H = 1$), indicating that a 1% increase in input prices leads to a 1% increase in revenues, as firms are price-takers and must fully pass through cost changes. Second, and crucially, the equilibrium test statistic (E-statistic), which uses profitability (ROA) as the dependent variable, should be equal to zero ($E = 0$). This is because, in a long-run competitive equilibrium, the free entry and exit of firms erodes any excess profits over time, rendering returns uncorrelated with input price movements. Any positive or negative correlation between input prices and profitability signals that the market is not in a settled, steady state and that some frictions are preventing the completion of this adjustment process.

5.2 Interpreting the Panzar-Rosse Results: A Market in Disequilibrium

The core of this analysis rests on the highly significant H-statistic of 0.946. In a vacuum, this value, being close to one, would indicate a market operating very near perfect competition. However, the Wald test strongly rejecting the long-run equilibrium condition ($E > 0$) fundamentally alters this interpretation. A market in true long-run perfect competition would exhibit both $H = 1$ and $E = 0$. The presence of positive economic profits implied by $E > 0$ is incompatible with the perfect competition paradigm. Therefore, the H-statistic of 0.946 cannot be taken at face value as evidence of a perfectly competitive structure.

Instead, the high H-value indicates that when input costs rise, Jamaican banks behave as if they are in a competitive market by nearly fully passing these costs through to revenues (interest income). The critical question is why they can do this while still earning positive economic profits. The disequilibrium signal ($E > 0$) provides the clue: it suggests that one or more structural conditions may exist that is preventing the market from settling into its theoretical long-run state. Drawing on the Panzar-Rosse literature, the rejection of equilibrium ($E \neq 0$) typically points to three potential underlying conditions: barriers to entry or exit, slow adjustment to shocks, or the presence of sustained market power.

5.2.1 Barriers to Entry and Exit

In a true equilibrium, high profits should attract new entrants, which would increase competition and drive profits down. Conversely, persistent losses should lead to exit. The Jamaican market, however, exhibits feature that impede this adjustment mechanism. The HHI data confirms a market structure that is inherently difficult to penetrate. Throughout the 25-year period, HHI values have consistently exceeded the 1,800-point threshold, with the top two institutions NCB, Scotia Bank, and CIBC accounting for over 60% of total banking assets. This concentration could indicate significant structural barriers to entry. New entrants like Sagikor (2008), JN Bank, and JMMB (2017) face high sunk costs associated with establishing a branch network, building brand recognition, and achieving the scale necessary to compete with incumbents. The profitability analysis underscores this challenge: while JMMB has sustained positive but diminishing returns, JN fell into negative profitability in 2023. This suggests that despite the theoretical possibility of entry, the practical reality is that new firms struggle to achieve sustainable profitability, limiting their ability to erode the excess profits of incumbents and push the market toward equilibrium.

5.2.2 Slow Adjustment to Shocks

The long-run equilibrium concept in the Panzar-Rosse model is static; it assumes markets have had sufficient time to fully adjust to all changes. The Jamaican banking sector, however, has been subjected to a series of shocks that have kept it in a constant state of adjustment. The declining trend in HHI from 2000 to 2024 is itself evidence of this slow-motion adjustment. The market has been undergoing a structural transition for over two decades, moving from an HHI above 3,000 to just above 2,000. This "deconcentration" is an ongoing process, not a completed one. Furthermore, discrete shocks have disrupted the path to equilibrium. The entry of new players in 2008 and 2017 acted as competitive shocks. More acutely, the COVID-19 pandemic caused an observable disruption: the H-statistic temporarily fell to 0.789, indicating that the normal pass-through of costs to revenues was interrupted.

The market has not yet had sufficient time to fully absorb these compounded shocks, which would allow it to settle into a new, stable long-run state. The post-2017 compression of industry profitability to a subdued range of 0.07 to 0.23, compared to the wider swings of the pre-2017 era, suggests the market is still searching for a new equilibrium level.

5.2.3 Presence of Market Power

The most compelling explanation for the coexistence of a high H-statistic and a positive E-statistic is the presence of sustained market power among the largest incumbents. An H-statistic near one can occur in a concentrated market if the leading firms engage in strategic behavior. When input costs fall, banks with significant market share do not need to lower their loan rates to compete aggressively. They can keep rates relatively high, maintaining revenue and allowing profits to swell. This creates an inverse relationship: input prices down causes profits to go up. Statistically, because revenue remains high when input prices drop, the H-statistic remains high (revenue correlates with input price direction). However, because profits move inversely with input prices, the E-statistic fires, signaling disequilibrium. The HHI data, particularly the loans based HHI which remains above 2,000 and has historically been the most concentrated dimension, confirms the existence of the market power necessary for this behavior. The profitability data supports this as well. With new entrants and a declining HHI, NCB and Scotia Bank Jamaica have maintained strong footholds and continued to drive industry trends, suggesting their core market power remains intact.

5.3 The Structural Context: HHI and Profitability Analysis

The HHI data provides the structural explanation for why this disequilibrium persists. Throughout the 25-year period, HHI values have consistently exceeded the 1,800-point threshold, confirming a highly concentrated market structure. Collectively, the top three institutions account for a dominant share of assets, loans, and deposits. This concentration profile creates an environment where the leading firms hold substantial sway, allowing them to influence pricing and maintain the positive economic profits detected by the E-statistic.

The declining trend in HHI from 2000 to 2024 is, however, crucial to understanding the market's current state. It reveals a market in slow, structural transition. The entry of Sagicor in 2008, and JN Bank and JMMB in 2017, provided genuine, albeit limited, competitive pressure, eroding the incumbents' market share. For example, the assets based HHI dropped by 129 points after Sagicor's entry and a further 647 points after 2017. This "deconcentration" is the "ongoing adjustment" referenced in the results, which explains the state of disequilibrium. The market is moving. It is in a state of flux, but it has not yet reached a new, stable long-run equilibrium.

The profitability data reinforces this narrative of transition and compression. Prior to 2017, the market was dominated by the three established banks, whose performance largely dictated industry trends, swinging between highs above 0.65 and lows below zero. The entry of JN and JMMB in 2017 introduced new dynamics. Initially recording modest but positive profitability, their arrival coincided with a period where industry profitability has generally trended lower, dipping to 0.07 in 2020 and remaining subdued at 0.11 in 2024. The newcomers have not risen to challenge the top banks in scale, but their presence coincides with a phase of lower and more stable industry returns. This suggests a more saturated market where new entrants absorb marginal demand, preventing incumbents from capturing disproportionate

profit growth, yet the incumbents' entrenched positions, bolstered by barriers to entry, prevent a full erosion of profits to competitive levels.

6. Conclusion

This study investigated the competitive dynamics of the Jamaican commercial banking sector from 2000 to 2024 by integrating the Panzar-Rosse model with Herfindahl-Hirschman Index analysis. The empirical findings reveal a complex market structure that defies simple classification, offering valuable insights for policymakers and industry stakeholders.

The Panzar-Rosse analysis yielded a highly significant H-statistic of 0.946, which, under conditions of long-run equilibrium, would indicate a market operating very near perfect competition. However, the Wald test strongly rejected the long-run equilibrium condition ($E > 0$), fundamentally altering this interpretation. This disequilibrium signal indicates that input prices remain correlated with bank profitability, a condition incompatible with the perfectly competitive paradigm. The coexistence of a near-unity H-statistic with a positive E-statistic constitutes the central paradox of this research: Jamaican banks behave as if they are in a monopolistic competitive market, yet the market structure prevents the full erosion of profits to competitive levels.

The HHI analysis resolved this paradox by providing the structural context. Throughout the period, HHI values consistently exceeded the 1,800-point threshold, confirming a highly concentrated market dominated by NCB, Scotia Bank, and CIBC. The gradual decline in HHI from peaks above 3,000 in 2000 to approximately 2,000 in 2024 reveals a market in slow, structural transition, driven by the entry of Sagikor (2008), JN Bank, and JMMB (2017). However, this deconcentration has been insufficient to dislodge incumbents or push the market into a new equilibrium state.

The rejection of long-run equilibrium points to three potential underlying conditions evident in the Jamaican data. First, barriers to entry are confirmed by the difficulty new entrants face in achieving sustainable profitability, with JN recording negative returns in 2023. Second, the market exhibits slow adjustment to shocks, including discrete entry events, the COVID-19 pandemic which temporarily depressed the H-statistic to 0.789, and the ongoing structural transition reflected in the declining HHI trend. Third, the presence of sustained market power among incumbents is evidenced by persistently high HHI values and the ability of NCB and Scotia Bank Jamaica to maintain strong market positions despite two decades of gradual deconcentration.

The findings carry important policy implications. The gradual decline in concentration suggests that policies facilitating new entry have been effective in increasing competitive pressure, and regulators should maintain an environment conducive to further entry. However, the persistence of market power, particularly in the loans market where HHI remains highest, suggests that competition authorities should closely monitor lending practices to ensure concentration does not translate into adverse outcomes for borrowers. Additionally, the fragility of competitive conduct revealed by the COVID-19 shock indicates that the high level of price competition observed under normal conditions may be susceptible to disruption during crises, warranting regulatory attention to contingency planning.

In conclusion, the Jamaican commercial banking sector is neither a textbook oligopoly nor a perfectly competitive market where profits are fully eroded. Rather, it is a market in motion, a concentrated industry where the conduct of firms is increasingly competitive, but where structural frictions, barriers to

entry, and/or the enduring power of incumbents prevent the realization of full long-run equilibrium. This dynamic tension between structure and conduct defines the Jamaican banking landscape and will likely continue to shape its evolution for years to come.

7. References

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Appendix

Table 4. Hausman Test for Long-Run Equilibrium

Hausman (1978) specification test	
	Coef.
Chi-square test value	5.352
P-value	.5

Table 5. Random Effect Model

Regression results							
lnIn	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnPOC	.136	.043	3.17	.001	.052	.22	***
lnPOD	.339	.081	4.20	0	.181	.497	***
lnPOL	.471	.088	5.38	0	.299	.643	***
POC _{covid}	-.35	.165	-2.13	.033	-.672	-.027	**
POD _{covid}	-.203	.081	-2.50	.013	-.362	-.044	**
POL _{covid}	.396	.162	2.44	.015	.077	.714	**
POC _{Rec}	.055	.046	1.19	.233	-.035	.145	
POD _{Rec}	-.096	.096	-1.01	.315	-.284	.091	
POL _{Rec}	.053	.098	0.54	.588	-.14	.246	
loanstoasset	1.334	.933	1.43	.153	-.496	3.163	
loanstocapital	-.057	.098	-0.58	.562	-.249	.135	
capitaltoasset	-2.892	2.747	-1.05	.292	-8.276	2.492	
Constant	-.236	.415	-0.57	.57	-1.049	.577	
Mean dependent var		-9.722	SD dependent var			0.679	
Overall r-squared		0.883	Number of obs			172	
Chi-square		.	Prob > chi2			.	
R-squared within		0.825	R-squared between			0.931	

*** $p < .01$, ** $p < .05$, * $p < .1$

Table 6. Variable-Specific Insights

Metric	Concentration Level	Driving Factors
Loans	Highest HHI	Big banks control credit supply (rigid market).
Deposits	Lowest HHI	Consumers diversify across banks.
Assets	Middle HHI	Reflects overall market power.

Table 7. Breakdown of HHI Values (2000-2024)

HHI	Loans	Deposits	Assets	Number of banks	Active Banks
2000	3,953	3,128	3,032	6	CIBC, NCB, First Global, Citi, Scotia, RBC
2001	3,943	3,275	2,989	6	CIBC, NCB, First Global, Citi, Scotia, RBC
2002	3,726	3,363	3,043	6	CIBC, NCB, First Global, Citi, Scotia, RBC
2003	3,445	3,326	3,024	6	CIBC, NCB, First Global, Citi, Scotia, RBC
2004	3,339	3,327	2,922	6	CIBC, NCB, First Global, Citi, Scotia, RBC
2005	3,088	3,128	2,888	6	CIBC, NCB, First Global, Citi, Scotia, RBC
2006	2,795	3,156	2,846	6	CIBC, NCB, First Global, Citi, Scotia, RBC
2007	2,724	3,083	2,856	6	CIBC, NCB, First Global, Citi, Scotia, RBC

2008	2,617	2,950	2,727	7	PanCaribbean enters
2009	2,657	2,930	2,687	7	CIBC, NCB, PanCaribbean, First Global, Citi, Scotia, RBC
2010	2,760	2,895	2,748	7	CIBC, NCB, PanCaribbean, First Global, Citi, Scotia, RBC
2011	2,919	2,955	2,790	7	CIBC, NCB, PanCaribbean, First Global, Citi, Scotia, RBC
2012	2,985	3,073	2,886	7	CIBC, NCB, Sagicor, First Global, Citi, Scotia, RBC
2013	2,966	3,004	2,947	6	RBC exits after 2013
2014	3,071	3,017	3,134	6	CIBC, NCB, Sagicor, First Global, Citi, Scotia
2015	2,945	2,942	2,965	6	CIBC, NCB, Sagicor, First Global, Citi, Scotia
2016	3,116	2,958	2,975	6	CIBC, NCB, Sagicor, First Global, Citi, Scotia
2017	2,249	2,296	2,329	8	JN Bank and JMMB enters
2018	2,356	2,281	2,386	8	CIBC, NCB, Sagicor, JN Bank, JMMB, First Global, Citi, Scotia
2019	2,260	2,192	2,377	8	CIBC, NCB, Sagicor, JN Bank, JMMB, First Global, Citi, Scotia
2020	2,249	2,137	2,333	8	CIBC, NCB, Sagicor, JN Bank, JMMB, First Global, Citi, Scotia
2021	2,367	2,071	2,295	8	CIBC, NCB, Sagicor, JN Bank, JMMB, First Global, Citi, Scotia
2022	2,285	2,125	2,328	8	CIBC, NCB, Sagicor, JN Bank, JMMB, First Global, Citi, Scotia
2023	2,189	2,117	2,325	8	CIBC, NCB, Sagicor, JN Bank, JMMB, First Global, Citi, Scotia
2024	2,066	2,079	2,272	8	CIBC, NCB, Sagicor, JN Bank, JMMB, First Global, Citi, Scotia

Table 8. Key Bank Changes Summarized

Year	Bank Change
2001	Trafalgar Commercial Bank → First Global Bank; Union Bank of Jamaica → RBTT Jamaica
2002	CIBC Jamaica → FirstCaribbean International Bank
2008	Pan Caribbean Merchant Bank licensed as PanCaribbeanBank Limited (commercial)
2011	RBTT Bank Jamaica → RBC Royal Bank (Jamaica)
2012	PanCaribbeanBank → Sagicor Bank Jamaica Limited
2014	Sagicor Bank merged into RBC Royal Bank (Jamaica), which was then renamed Sagicor Bank Jamaica Limited
2017	Jamaica National Building Society → JN Bank Limited (commercial); JMMB Merchant Bank → JMMB Bank (Jamaica) Limited (commercial)
2024	FirstCaribbean International Bank → CIBC Caribbean Bank (Jamaica) Limited

Table 9. Top Three (3) Largest Commercial Banks by Share of Total Assets

Year	Three (3) Largest Banks (by Share of Total Assets)
2001	NCB, Scotia, RBC
2002	NCB, Scotia, RBC
2003	NCB, Scotia, RBC
2004	NCB, Scotia, RBC
2005	NCB, Scotia, RBC
2006	NCB, Scotia, RBC
2007	NCB, Scotia, RBC
2008	NCB, Scotia, RBC
2009	NCB, Scotia, RBC
2010	NCB, Scotia, RBC
2011	NCB, Scotia, RBC
2012	NCB, Scotia, Sagicor
2013	NCB, Scotia, Sagicor
2014	NCB, Scotia, Sagicor
2015	NCB, Scotia, Sagicor
2016	NCB, Scotia, Sagicor
2017	NCB, Scotia, JN Bank
2018	NCB, Scotia, JN Bank
2019	NCB, Scotia, JN Bank
2020	NCB, Scotia, JN Bank
2021	NCB, Scotia, JN Bank
2022	NCB, Scotia, JN Bank
2023	NCB, Scotia, JN Bank
2024	NCB, Scotia, JN Bank

Table 10. Share of Total Assets, Loans and Deposits Held by Top Three (3) Largest Commercial Banks

Year	Share of Total Assets	Share of Total Loans	Share of Total Deposits
2000	88.7%	91.1%	87.7%
2001	88.0%	91.6%	87.7%
2002	88.2%	89.9%	89.3%
2003	87.2%	90.9%	88.3%
2004	85.8%	90.1%	88.3%
2005	84.7%	87.2%	85.9%
2006	83.6%	82.9%	86.7%
2007	83.1%	82.7%	87.0%
2008	81.2%	83.9%	86.0%
2009	82.8%	84.1%	86.1%
2010	83.6%	85.6%	86.2%
2011	83.5%	85.6%	86.6%

2012	84.9%	87.2%	87.4%
2013	83.9%	85.3%	85.8%
2014	84.7%	85.7%	86.0%
2015	83.5%	84.8%	84.5%
2016	84.4%	85.3%	85.2%
2017	74.6%	72.3%	75.4%
2018	75.8%	73.3%	75.2%
2019	74.2%	71.6%	73.4%
2020	73.5%	71.1%	71.9%
2021	72.1%	70.6%	70.5%
2022	72.4%	70.0%	71.1%
2023	72.3%	69.3%	70.9%
2024	71.3%	68.0%	69.7%

Figure 1. HHI Trends (2000-2024)

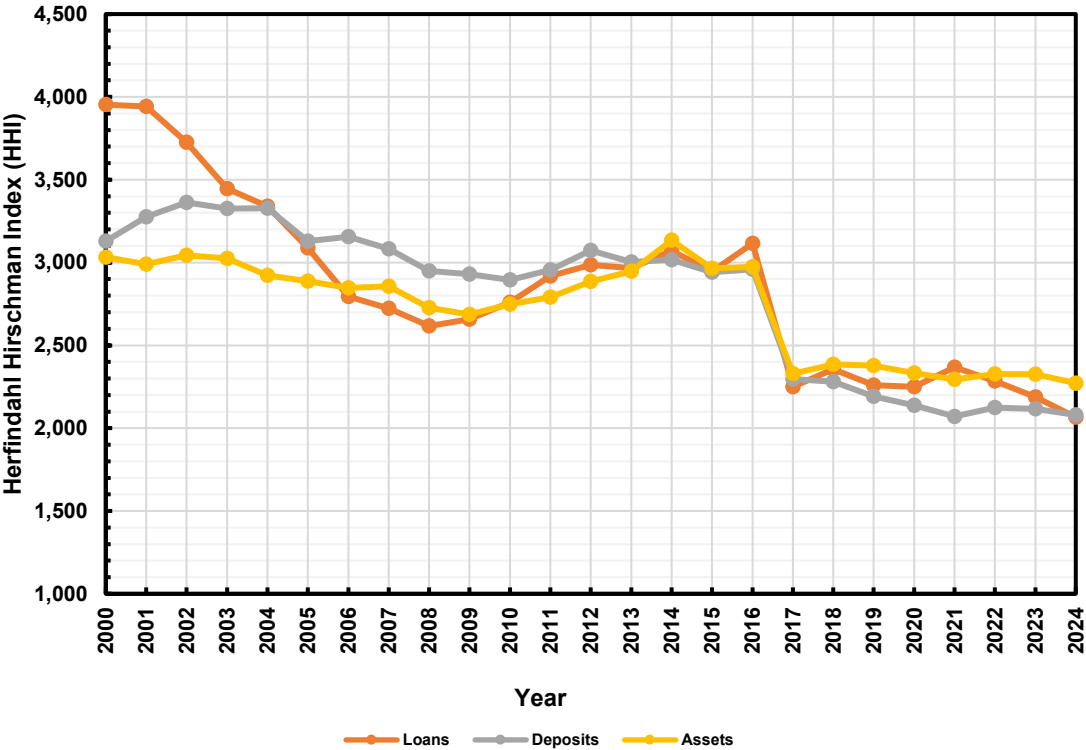


Figure 2. Percentage share of loans, assets, and deposits for each bank in 2024

